# Mission Shares Policy

Mission directorate shares have been implemented on HECC systems for more than ten years. Implementing shares guarantees that each mission directorate gets its fair share of resources.

The share to which a job is assigned is based on the project group ID (GID) used by the job. After all the cores within a mission directorate's share have been assigned, other jobs assigned to that share must wait. This is true even if cores are available in a different mission directorate's share, with the following exception:

When a mission directorate is not using all of its cores, other mission directorates can borrow those cores, but only for jobs that will finish within 4 hours. When part of the resource is unavailable, the total number of cores decreases, and each mission directorate loses a proportionate number of cores.

You can display the share distribution by adding the **-W shares=-** option to the **qstat** command. For example:

```
%qstat -W shares=-

Group   Share% Use%  Share Exempt    Use  Avail Borrowed Ratio Waiting
------- ------ ---- ------ ------ ------ ------ -------- ----- -------
Overall    100    0 405070      0     44 405026        0  0.00   47680
 ARMD       27   28 110166    747 116736      0     6570  1.06  392206
 HEOMD      23   21  93560   1360  87952   5608        0  0.94  125004
 SMD        33   33 136088     16 136696      0      608  1.00  390340
 ASTRO      14    7  56703      0  30724  25979        0  0.54  131656
 NAS         2    0   8505      0   3080   5425        0  0.36   67488
```

Mission shares are calculated by combining the mission's HECC share of the shared assets with the mission-specific assets. The second column of the sample output above shows the mission shares. Other information displayed includes: the amount of resources used and borrowed by each mission, the amount of resources available to each mission, and the resources each mission is waiting for.

The **qs** utility (available under **/u/scicon/tools/bin/qs**) provides similar information, and also includes details that break the resources into the different processor types. In addition, the utility can show the remaining time for jobs that are running, or how much time was requested by waiting jobs.

Specify the **-h** option of **qs** for instructions on how to use it. For example:

```
% /u/scicon/tools/bin/qs -h

usage: qs [-d] [-D] [-h] [-M] [-n N] [-o] [-r] [-s svr] [-t] [-u] [-v] [-w]
               [-x] [--audit f] [--file f] [--runout f] [--user U]
       -d         : darker colored resource bars (for a light background)
       -D         : show count of offline & down nodes
       -h         : provide this message
       -n NUM     : show time remaining before NUM nodes are free
       -N NUM     : show time remaining before NUM nodes are free; suppress
                    other output
       -o         : show old-style resource usage without time information
       -r         : show runout times & expansion factors
       -s svr     : show data for PBS server svr [default: pbspl1]
       -t         : show time remaining & nodes used for each running job
       -u         : highlight resources for jobs of user running qs
       -v         : (verbose) provide explanation of display elements
       -w         : have resource bars show wait time, not remaining time
                    (cannot be used with -n, -o, -t, or -x)
       -x         : have resource bars show expansion factor of jobs,
                    not remaining time (cannot be used with -n, -o, -t or -w)
       --audit f  : reserved for debugging
       --file f   : reserved for debugging
       --runout f : put runout information in file f
```

```
      --user U   : highlight resources for jobs of users U (comma-separated list)
      --noShares : highlight resources for jobs that could start now if no shares
      --1node    : highlight resources for jobs that use only 1 node
```

Here is a sample output file of **qs**:

```
pbspl1:10-Oct-2019 13:07  100% of mission share
ARMD        |
r:105%  14335     :::+325+55555555
w:412%  .4.55     :::+325+55555555
        :5:5      ::::+555+5555555+
        :545      :::5+555+5555555+
        1:55      :::5+555+5555555+
        2215      :::535.525555555+
        2245      :::+35+555555555
              -running, exempt from share
HEOMD       |
r: 95%  .33:      :;#25+
w:138%  +4+#      :#.55#
        352#      ;#55##
        4:3;      ;#55#
        ++.;      ;#55#
        11.2      ;#55#
              -running, exempt from share
ASTRO       |
r: 54%  251   +155+2551
w:233%  52  2+25512521
        54  5+25+225+

SMD         |
r:100%  .;5##     ::1:++++1111111111111111111111111111111111111111112+2+1
w:1369% 3++#      :::1++++1111111111111111111111111111111111111111112+251
        1#4#      ::.1++++1111111111111111111111111111111111111111112+251
        1#1#      :::5++++1111111111111111111111111111111111111111112+251
        2###      :::5++++1111111111111111111111111111111111111111112+551
        41##      ::3:++++1111111111111111111111111111111111111111115+551
        51##      ::5:++++1111111111111111111111111111111111111111151+51
        #4##      ::;:++++1111111111111111111111111111111111111115155
        -running-  -waiting-----------------------------------------------
              -running, exempt from share
Key:     <=1h     <=2h     <=4h     <=8h     <=1d     <=2d     <=3d     <=4d     <=5d     >5d
          .        :        ;        +        1        2        3        4        5        #
Pleiades Used Nodes (above) .... san:1544  ivy:4713  has:1929  bro:1892  ele:1135  sky:2191  cas:1024
Pleiades Unused Nodes (below)... san:   1  ivy:   0  has:   1  bro:   4  ele:   4  sky:   0  cas:   0
Unused, but limited by Resv .... san:   0  ivy:   0  has:   0  bro:   2  ele:   0  sky:   0  cas:   0
Unused in devel,*ops queues .... san: 209  ivy: 243  has:  93  bro:  90  ele:   0  sky:   0  cas:   0
    Unused GPU Nodes (G,G) .........   58                                                  12
Unused ldan Nodes (L) .......... san:   3
Unused ded Nodes (Q,Q,Q,Q,Q,Q,Q) san:  36  ivy:  53  has:   5  bro:   1  ele:   0  sky:  41  cas: 106
        s  i  Q
          ib  Q

Merope Unused ........ wes: 398
        ww


Each letter/number/symbol (w,s,i,h,b,e,k,c,#,#,#,#,#,#,#,#) ~= the same number of SBUs/hr
(which varies with your window width and current mix of jobs running and queued)
==> in nodes: w,# ~= 354.4 wes; s,# ~= 265.8 san; i,# ~= 212.6 ivy; h,# ~= 177.2 has;
              b,# ~= 151.9 bro; e,# ~= 151.9 bro_ele; k,# ~= 106.3 sky_ele; c,# ~= 106.3 cas_ait nodes.
```

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